c. **Amendments to Claims**

1. (previously presented) A system for monitoring or imaging a sample, comprising:

an optical interferometer comprising a measurement arm, a reference arm, and an optical splitter, the arms being coupled to receive light from the optical splitter and to output light, the measurement arm being configured to output light that a portion of the interior of the sample produces in response to being illuminated by the measurement arm, the interferometer being configured to interfere the light outputted by the arms, one of the arms having an acousto-optical modulator to frequency shift light therein; and

a detector configured to make a measurement on the interfered light and to use the measurement and a signal representative of the frequency shift caused by the acousto-optical modulator to determine a speed of the portion of the interior of the sample.

2. (canceled)

3. (previously presented) The system of claim 1, wherein the detector is configured to use the interfered light to determine a signed displacement of the portion of the interior of the sample.

4. (previously presented) The system of claim 1, further comprising:

an optical source coupled to transmit light to the measurement and reference arms and capable of producing light with a coherence length of less than 1 centimeter.

5. (previously presented) The system of claim 1, further comprising:

an optical source coupled to transmit light to the measurement and reference arms and capable of producing light with a coherence length of less than 1 millimeter.

6. (currently amended) The system of claim 1, wherein ~~one of~~ the reference arm ~~and the measurement arm~~ has a variable optical path length.

7. (withdrawn) A system for medical monitoring or imaging of a patient or animal, comprising:

an optical interferometer having a measurement arm, a reference arm, and an optical splitter, the arms being coupled to receive light from the optical splitter and configured to cause light outputted by the arms to interfere; and

an interference detector coupled to receive a portion of the interfering light and configured to determine information representative of a location, an orientation, or a velocity of a portion of the patient or animal from the received light; and

a controller coupled to receive the information and to adjust collected data on the animal or patient in a manner responsive to a change in a relative location, orientation, or velocity between a probe and a portion of the interior of a tissue in the animal or patient.

8. (withdrawn) The system of claim 7, wherein the controller is configured to adjust collected image data to correct the image data for motion of the interior of the tissue in the animal or patient.

9. (withdrawn) The system of claim 7, wherein the controller is configured to control the position of the probe.

10. (withdrawn) The system of claim 7, wherein one of the reference arm and the measurement arm has a variable optical path length.

11. (withdrawn) The system of claim 7, wherein one of the reference arm and the measurement arm includes an acousto-optical modulator.

12. (withdrawn) The system of claim 7, wherein the detector is configured to determine one of a velocity and a signed displacement of the portion of the interior of the tissue based on the received interfering light.

13. (withdrawn) The system of claim 7, wherein the measurement arm includes an optical endoscope for sending light to and receiving light from the portion of the interior of the tissue of the patient or animal.

14. (withdrawn) The system of claim 13, wherein the endoscope includes an optical fiber configured to perform the sending and receiving.

15. (previously presented) A process for monitoring a sample, comprising:

transmitting light to measurement and reference arms of an interferometer, the measurement arm being configured to illuminate the sample with light;

acousto-optically frequency shifting light in one of the reference arm and the measurement arm;

collecting light from the measurement arm in response to the light scattering off a portion of the interior of the sample;

interfering light from the reference arm with the collected light; and

determining a speed of the portion of the interior of the sample from a measurement on the interfering light and a signal representative of the performed acousto-optical frequency shifting.

16. (previously presented) The process of claim 15, further comprising:

determining a signed displacement of the portion of the interior of the sample based on the measurement of the interfering light.

17. (original) The process of claim 15, wherein the transmitted light has a coherence length of less than 1 centimeter.

18. (previously presented) The system of claim 3, wherein the detector is configured to determine the speed as a function of depth in the sample.

19. (previously presented) The process of claim 15, wherein the determining step finds the speed as a function of depth in the sample.

20. (new) The process of claim 16, further comprising:

varying the length of the reference arm during the transmitting step.